



General

Guideline Title

Best evidence statement (BEST). Physical therapy during the hemopoietic stem cell transplant process to improve quality of life.

Bibliographic Source(s)

Cincinnati Children's Hospital Medical Center. Best evidence statement (BEST). Physical therapy during the hemopoietic stem cell transplant process to improve quality of life. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2014 Mar 18. 9 p. [17 references]

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

The strength of the recommendation (strongly recommended, recommended, or no recommendation) and the quality of the evidence (1a-5b) are defined at the end of the "Major Recommendations" field.

1. It is strongly recommended that physical therapists provide exercise therapy, including endurance and strength training, throughout the hemopoietic stem cell transplant (HSCT) process to reduce/minimize the effects of immobility and consequences of the HSCT treatment, which contributes to improved quality of life (QoL) (Wolin et al., 2010 [1a]; Wiskemann & Huber, 2008 [1b]; Baumann et al., 2011 [2b]; Hacker et al., 2011 [2b]; Baumann et al., 2010 [2b]; Hayes et al., 2004).

Note 1: Side effects of immunosuppressive therapy and bed rest can include loss of muscle mass, strength and endurance (Wolin et al., 2010 [1a]; Knols et al., 2005 [1a]; Wiskemann & Huber, 2008 [1b]; Baumann et al., 2011 [2b]).

Note 2: Pediatric patients benefitted from frequent, supervised intervention, suggesting the need for higher frequency to achieve desired outcomes (Wolin et al., 2010 [1a]).

Note 3: Full recovery from HSCT is a 3 to 5 year process. Recovery may be accelerated by exercise interventions to increase work related capabilities, improve social support and manage depression (Syrjala et al., 2004 [4a]).

2. It is recommended that a physical therapist provide the following interventions in the pre-transplant phase:
 - a. Complete a physical therapy examination to establish a baseline level of function and QoL (Local Consensus, 2013 [5]).
 - b. Make recommendations for treatment (based upon) specific to the evaluation results, as appropriate (Wiskemann et al., 2011 [2b]; Local Consensus, 2013 [5]).
 - c. Educate families regarding the benefits of structured exercise therapy throughout the HSCT process to reduce the effects of immobility and consequences of the HSCT treatment (Local Consensus, 2013 [5]).

Note 1: It is preferred the physical therapy examination be completed, including assessments of strength, endurance and QoL, prior to the initiation of the preparative regimen and inpatient admission for HSCT in order to obtain an accurate baseline measurement and identify needs for physical therapy intervention (Wiskemann et al., 2011 [2b]; Local Consensus, 2013 [5]).

Note 2: Caregiver and patient education should be provided using appropriate methods including, but not limited to instructional materials or 1:1 educational sessions (Local Consensus, 2013 [5]).

3. It is strongly recommended that during the HSCT inpatient stay, starting at admission or the initiation of the preparative treatment regimen and continuing until discharge, a physical therapist provide a supervised, low to moderate intensity exercise program to positively affect QoL, including:
 - a. Aerobic endurance training (Wolin et al., 2010 [1a]; Wiskemann & Huber, 2008 [1b]; Knols et al., 2011 [2a]; Baumann et al., 2011 [2b]; Baumann et al., 2010 [2b]; Jarden et al., 2009 [2b]; Jarden et al., 2007 [2b])
 - b. Exercises dealing with strength, balance/coordination and flexibility (Wolin et al., 2010 [1a]; Wiskemann & Huber, 2008 [1b]; Knols et al., 2011 [2a]; Baumann et al., 2011 [2b]; Baumann et al., 2010 [2b]; Jarden et al., 2009 [2b]; Jarden et al., 2007 [2b])

Note 1: During the inpatient stay for HSCT, the risk of infection is high and physical activity options may be restricted, therefore equipment and exercise options may be reduced (Wolin et al., 2010 [1a]; Local Consensus, 2013 [5]).

Note 2: A higher frequency exercise program (i.e., 5 times per week or daily) is beneficial in stabilizing physical performance (Wolin et al., 2010 [1a]; Wiskemann & Huber, 2008 [1b]; Jarden et al., 2009 [2b]).

Note 3: A low to moderate intensity exercise program for 30 to 60 minutes (with rest intervals as needed) may include:

- a. Aerobic exercise at 50% to 75% of the heart rate max and a rate of perceived exertion (RPE) of 10 to 13
 - b. Strengthening/stretching exercises at an RPE of 10 to 13
 - c. Progressive relaxation exercises at an RPE of 6 to 9 (Jarden et al., 2009 [2b]; Local Consensus, 2013 [5])
4. It is recommended that during the HSCT inpatient stay, a physical therapist provide interventions to promote functional mobility, including transfers, walking and stair climbing (Baumann et al., 2011 [2b]; Local Consensus, 2013 [5]) and relaxation through progressive relaxation exercises (Jarden et al., 2009 [2b]; Jarden et al., 2007 [2b]).
5. It is strongly recommended that following discharge from the HSCT inpatient stay, a physical therapist provide a supervised, scheduled moderate intensity exercise program (with the goal to return the individual to functional baseline level or until progress is no longer demonstrated) including the following:

- a. Aerobic endurance training (Wolin et al., 2010 [1a]; Wiskemann & Huber, 2008 [1b]; Knols et al., 2011 [2a]; Wiskemann et al., 2011 [2b])
 - b. Exercises dealing with strength, balance/coordination and flexibility (Wolin et al., 2010 [1a]; Wiskemann & Huber, 2008 [1b]; Knols et al., 2011 [2a]; Wiskemann et al., 2011 [2b])

Note 1: The exercise program is designed to reduce fatigue, improve physical function and positively affect QoL (Wiskemann et al., 2011 [2b]).

Note 2: A minimum frequency and duration (i.e., 2x/week for 6 to 12 weeks) may be beneficial at this stage of recovery (Knols et al., 2005 [1a]; Local Consensus, 2013 [5]; Hayes et al., 2004).

Note 3: A moderate intensity exercise program for 30 to 60 minutes may include:

- a. Aerobic exercise starting at 50% to 60% and increasing up to 70% to 80% of the heart rate max and a RPE up to 15
 - b. Strengthening/stretching exercises at an RPE of 10 to 13 (Knols et al., 2011 [2a]; Local Consensus, 2013 [5])
6. It is recommended that during outpatient program following HSCT a physical therapist provide interventions to promote functional mobility, including transfers, walking and stair climbing (Knols et al., 2011 [2a]; Local Consensus, 2013 [5]).

Definitions:

Table of Evidence Levels

Quality Level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain

Quality Level	Definition
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local Consensus

†a = good quality study; b = lesser quality study.

Table of Language and Definitions for Recommendation Strength

Strength	Definition
It is strongly recommended that...	When the dimensions for judging the strength of the evidence are applied, there is high support that benefits clearly outweigh risks and burdens (or vice-versa for negative recommendations).
It is strongly recommended that... not...	
It is recommended that...	When the dimensions for judging the strength of the evidence are applied, there is moderate support that benefits are closely balanced with risks and burdens.
It is recommended that... not...	
There is insufficient evidence and a lack of consensus to make a recommendation...	

Note: See the original guideline document for the dimensions used for judging the strength of the recommendation.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Diseases/conditions requiring hemopoietic stem cell transplant (HSCT)

Guideline Category

Management

Treatment

Clinical Specialty

Oncology

Pediatrics

Physical Medicine and Rehabilitation

Intended Users

Advanced Practice Nurses

Physical Therapists

Physician Assistants

Physicians

Guideline Objective(s)

To evaluate, among school aged children and adolescents receiving hemopoietic stem cell transplant (HSCT), if physical therapy (PT) intervention (active participation in mobility, endurance, strength exercise) compared to no intervention improves the patient's quality of life (QoL)

Target Population

School aged children, adolescents and young adults age 6 to 21 years receiving hemopoietic stem cell transplant (HSCT) (during both inpatient and outpatient phases)

Note: This guideline does not apply to individuals unable to cognitively participate (unable to follow commands or instructions) in a structured exercise program

Interventions and Practices Considered

Physical therapy (PT) (active participation in mobility, endurance, strength exercise)

Major Outcomes Considered

Improvement of patient quality of life (QoL)

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Search Strategy

- Databases: Trip, PubMed Clinical Queries, Pediatric Physical Therapy, EBSCO, CINAHL Plus with full text, PEDro, MEDLINE, CINAHL, Cochrane, CAOT, OT Seeker, OTEvidence, Center for Evidence Based Medicine, National Guideline Clearinghouse (NGC), Google Scholar, Rehabilitative Reference Center, Cochrane library
- Search Terms: exercise, bone marrow transplant, stem cell transplant, children, pediatric, childhood, physical therapy, quality of life, pediatric, cancer, physical activity, bone marrow transplant + physical therapy, bone marrow transplant + rehabilitation, bone marrow transplant + child + rehabilitation, bone marrow transplant + quality of life , brain tumors, therapy, occupational therapy, autologous bone marrow transplant, fatigue + bone marrow transplant, daily living + bone marrow transplant, self-care + bone marrow transplant
- Limits and Filters: Limits and filters were applied randomly to individual databases by multiple people participating in the search. Those include: 2000 to 2011, pediatrics.
- Last Search Date: December 2013

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Table of Evidence Levels

Quality Level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local Consensus

†a = good quality study; b = lesser quality study.

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Not stated

Rating Scheme for the Strength of the Recommendations

Table of Language and Definitions for Recommendation Strength

Strength	Definition
It is strongly recommended that...	When the dimensions for judging the strength of the evidence are applied, there is high support that benefits clearly outweigh risks and burdens (or vice-versa for negative recommendations).

Strength	Definition
It is strongly recommended that... not...	
It is recommended that... It is recommended that... not...	When the dimensions for judging the strength of the evidence are applied, there is moderate support that benefits are closely balanced with risks and burdens.
There is insufficient evidence and a lack of consensus to make a recommendation...	

Note: See the original guideline document for the dimensions used for judging the strength of the recommendation.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Peer Review

Description of Method of Guideline Validation

This Best Evidence Statement (BEST) has been reviewed against quality criteria by two independent reviewers from the Cincinnati Children's Hospital Medical Center (CCHMC) Evidence Collaboration.

Evidence Supporting the Recommendations

References Supporting the Recommendations

Baumann FT, Kraut L, SchÃ¼le K, Bloch W, Fauser AA. A controlled randomized study examining the effects of exercise therapy on patients undergoing haematopoietic stem cell transplantation. *Bone Marrow Transplant*. 2010 Feb;45(2):355-62. [PubMed](#)

Baumann FT, Zopf EM, Nykamp E, Kraut L, SchÃ¼le K, Elter T, Fauser AA, Bloch W. Physical activity for patients undergoing an allogeneic hematopoietic stem cell transplantation: benefits of a moderate exercise intervention. *Eur J Haematol*. 2011 Aug;87(2):148-56. [PubMed](#)

Hacker ED, Larson J, Kujath A, Peace D, Rondelli D, Gaston L. Strength training following hematopoietic stem cell transplantation. *Cancer Nurs*. 2011 May-Jun;34(3):238-49. [PubMed](#)

Hayes S, Davies PS, Parker T, Bashford J, Newman B. Quality of life changes following peripheral blood stem cell transplantation and participation in a mixed-type, moderate-intensity, exercise program. *Bone Marrow Transplant*. 2004 Mar;33(5):553-8. [PubMed](#)

Jarden M, Baadsgaard MT, Hovgaard DJ, Boesen E, Adamsen L. A randomized trial on the effect of a multimodal intervention on physical capacity, functional performance and quality of life in adult patients undergoing allogeneic SCT. *Bone Marrow Transplant*. 2009 May;43(9):725-37. [PubMed](#)

Jarden M, Hovgaard D, Boesen E, Quist M, Adamsen L. Pilot study of a multimodal intervention: mixed-type exercise and psychoeducation in patients undergoing allogeneic stem cell transplantation. *Bone Marrow Transplant.* 2007 Oct;40(8):793-800. [PubMed](#)

Knols R, Aaronson NK, Uebelhart D, Fransen J, Aufdemkampe G. Physical exercise in cancer patients during and after medical treatment: a systematic review of randomized and controlled clinical trials. *J Clin Oncol.* 2005 Jun 1;23(16):3830-42. [PubMed](#)

Knols RH, de Bruin ED, Uebelhart D, Aufdemkampe G, Schanz U, Stenner-Liewen F, Hitz F, Taverna C, Aaronson NK. Effects of an outpatient physical exercise program on hematopoietic stem-cell transplantation recipients: a randomized clinical trial. *Bone Marrow Transplant.* 2011 Sep;46(9):1245-55. [PubMed](#)

Syrjala KL, Langer SL, Abrams JR, Storer B, Sanders JE, Flowers ME, Martin PJ. Recovery and long-term function after hematopoietic cell transplantation for leukemia or lymphoma. *JAMA.* 2004 May 19;291(19):2335-43. [PubMed](#)

Wiskemann J, Dreger P, Schwerdtfeger R, Bondong A, Huber G, Kleindienst N, Ulrich CM, Bohus M. Effects of a partly self-administered exercise program before, during, and after allogeneic stem cell transplantation. *Blood.* 2011 Mar 3;117(9):2604-13. [PubMed](#)

Wiskemann J, Huber G. Physical exercise as adjuvant therapy for patients undergoing hematopoietic stem cell transplantation. *Bone Marrow Transplant.* 2008 Feb;41(4):321-9. [PubMed](#)

Wolin KY, Ruiz JR, Tuchman H, Lucia A. Exercise in adult and pediatric hematological cancer survivors: an intervention review. *Leukemia.* 2010 Jun;24(6):1113-20. [PubMed](#)

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Trends suggest physical therapy (PT) intervention (active participation in mobility, endurance, strength exercise) during hemopoietic stem cell transplant (HSCT) hospitalization to be feasible, safe, well tolerated and of possible benefit to quality of life (QoL)

Potential Harms

Not stated

Qualifying Statements

Qualifying Statements

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This

document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

Implementation of the Guideline

Description of Implementation Strategy

Applicability Issues

Hemopoietic stem cell transplant (HSCT) patients need to be identified early by members of the health care team in order to facilitate referral for physical therapy (PT) evaluation of appropriate patients in the pre-HSCT phase. Hindrances to early referral may include patient geographic location, medical status and schedule conflicts within the HSCT work-up.

Exercise intervention should be provided by physical therapists who have knowledge of the HSCT process. Additional staffing resources need to be identified, to cover the demands for high utilization of therapy resources.

Collaboration and planning is required to expedite management of patient care across inpatient and outpatient settings, including appropriate notification, referral and sharing of information by inpatient and outpatient physical therapists.

Implementation Tools

Audit Criteria/Indicators

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Cincinnati Children's Hospital Medical Center. Best evidence statement (BEST). Physical therapy during the hemopoietic stem cell transplant process to improve quality of life. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2014 Mar 18. 9 p. [17 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2014 Mar 18

Guideline Developer(s)

Cincinnati Children's Hospital Medical Center - Hospital/Medical Center

Source(s) of Funding

Cincinnati Children's Hospital Medical Center

No external funding was received for development of this Best Evidence Statement (BES_t).

Guideline Committee

Not stated

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Financial Disclosures/Conflicts of Interest

Conflict of interest declaration forms are filed with the Cincinnati Children's Hospital Medical Center (CCHMC) Evidence-Based Decision Making (EBDM) group. No financial conflicts of interest were found.

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the [Cincinnati Children's Hospital Medical Center Web site](#) .

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center James M. Anderson Center for Health Systems Excellence at EBDMInfo@cchmc.org.

Availability of Companion Documents

The following are available:

- Judging the strength of a recommendation. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the [Cincinnati Children's Hospital Medical Center \(CCHMC\) Web site](#) .
- Grading a body of evidence to answer a clinical question. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the [CCHMC Web site](#) .
- Table of evidence levels. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the [CCHMC Web site](#) .

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center James M. Anderson Center for Health Systems Excellence at EBDMInfo@cchmc.org.

In addition, suggested process or outcome measures are available in the [original guideline document](#) .

Patient Resources

None available

NGC Status

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